



Novec™

Brand

3M™ Novec™ 1230 Fire Protection Fluid

Power Industry Upgrades:

New building codes open doors to safer fire suppression

When it comes to safety, power generation is a highly regulated industry, and one of its greatest risks is fire. An electrical fire has the capacity to quickly grow out of control causing catastrophic consequences anywhere along the generation or distribution pathway. Having a responsive fire suppression system in place is vital to help ensure the safety of power utility personnel and infrastructure, and continuity of service.

In 2011, in response to concerns regarding worker safety, the local Committee on Building Standards and Tests granted a major power company subsidiary a variance allowing installation of an alternative fire suppression system. Improved worker safety was the main driver for the power company to pursue the variance action. The granted variance allows use of 3M's Novec 1230 fluid for fire protection. With the variance granted, the power company had a new option to upgrade their fire suppression systems, leading to a fresh look at different systems and performance characteristics.



How fire suppression works

Three components must be present for a fire to ignite and burn: a fuel source, heat to ignite the fuel, and oxygen to keep it burning. Take one of these three things away and the fire goes out, which is what fire suppression systems aim to do.

Suppression performance is dictated by the unique properties of the suppression agents.

For example, a CO₂ system primarily suffocates a fire by displacing the oxygen in the enclosed space where the fire occurs, with only a minor cooling effect. Unfortunately, when

concentrations reach typical fire protection design levels, the CO₂ system can be lethal to people in the room. The risk of serious injury or fatalities from CO₂ discharges is the reason the power company's safety codes were updated to allow systems that use Novec 1230 fluid.

Applications in the power industry

People rely on having a steady stream of electricity, making it vital to address a fire as safely and as quickly as possible to avoid blackouts and shutdowns.

To ensure power delivery, common facilities like the main distribution frame (MDF), control rooms, switchgear and battery rooms, static VAR compensator (SVC) buildings and indoor transformer bays, must be kept operational at all time. Yet within all of these places, there is enough heat, fuel and oxygen to start and feed a fire.

Transformers, high-voltage capacitors and circuit breakers are commonly insulated with transformer oil. While this oil is actually a coolant, it does have a flash point and can ignite, causing explosions and fires. These are dangerous situations that can cause significant damage to electrical equipment and widespread power outages. Having a fast-acting fire suppression system in these areas is one of the best ways to maintain power delivery, minimize damage and help keep people safe.

Exposure risks and regulations

During a fire, a CO₂ suppression system must release a minimum concentration of 34 percent of CO₂ to effectively extinguish a fire.²



3M's Novec 1230 fluid for fire protection

In National Institute for Occupational Safety and Health (NIOSH) testing, concentrations at 30 percent CO₂ produced unconsciousness in humans within 24 – 28 seconds.³ That's not a lot of time to react, and while many CO₂ systems are equipped with lockout systems and other controls to protect people, accidents and failures can occur, resulting in serious injury and fatalities.

Novec 1230 fluid has the highest safety margin among clean agents listed in the National Fire Protection Association (NFPA) 2001: Standard on Clean Agent Fire Suppression Systems. The No Observable Adverse Effect Level (NOAEL) for any end point of acute toxicity has been determined to be 10 volume percent in air.

With design concentrations in typical power generation applications at a minimum of 5.9% for SVE and transformer hazards, the NOAEL of 10% for Novec 1230 fluid provides a wide margin of safety and peace of mind to a greater extent compared with CO₂ fire suppression protection.

Safety plus performance

Safety was undoubtedly the leading factor for choosing Novec 1230 fluid, but its performance was also a consideration. Facility managers wanted assurance that Novec 1230 fluid was an effective agent to extinguish transformer fires.

Novec 1230 fluid underwent a series of rigorous tests, which yielded positive results. In particular, it quickly extinguished fires from transformer oil and helped prevent dangerous re-flashing (reigniting) in the enclosed and volatile area.

In all industries, protecting workers' lives is paramount. This is not easy when the workplace poses many potential hazards, but as one power company realized, sometimes it's as simple as leveraging a code change to increase protection.

Novec 1230 fluid from 3M is an advanced fire suppression solution with a wide margin of safety, proven performance and environmental sustainability, which make it an ideal fit for the global power generation industry.

Benefits at a glance

Fortunately, there are innovative solutions for optimizing performance in power generation and distribution while helping to protect worker safety. A clean agent fire suppression system using 3M™ Novec™ 1230 Fire Protection Fluid is one such solution that has another positive characteristic – environmental sustainability.

Novec 1230 fluid has a global warming potential of less than one, and relative to hydrofluorocarbons (HFCs) such as FM-200™, used in clean agent fire suppression, can reduce greenhouse gas emissions from a system discharge by more than 99 percent. After careful evaluation of a variety of alternative systems, the power company chose a fire suppression system utilizing Novec 1230 fluid for its excellent safety benefits and environmental sustainability.

Notes and References:

¹ osha.gov. *Chemical Sampling Data: Carbon Dioxide*. Retrieved from https://www.osha.gov/dts/chemicalsampling/data/CH_225400.html

² epa.gov. *Carbon Dioxide as a Fire Suppressant: Examining the Risks*. Retrieved from <http://www3.epa.gov/ozone/snap/fire/co2/co2report.html>

³ cdc.gov. *Criteria for a Recommended Standard: Occupational Exposure to Carbon Dioxide*. Retrieved from <http://www.cdc.gov/niosh/docs/1970/76-194.html>

The 3M™ Novec™ Brand Family

The Novec brand is the hallmark for a variety of proprietary 3M products. Although each has its own unique formula and performance properties, all Novec products are designed in common to address the need for safe, effective, sustainable solutions in industry-specific applications. These include precision and electronics cleaning, heat transfer, fire protection, protective coatings, immersion cooling, advanced insulation media replacement solutions and several specialty chemical applications.

3M™ Novec™ Engineered Fluids • 3M™ Novec™ Aerosol Cleaners • 3M™ Novec™ 1230 Fire Protection Fluid • 3M™ Novec™ Electronic Grade Coatings • 3M™ Novec™ Electronic Surfactants • 3M™ Novec™ Dielectric Fluids

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